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Applicant: Bayerische Motoren Werke AG [BMW AG, Munich, Germany]

Inventor: Harry Geiger

The following publications were taken into consideration for the determination of patentability:

DE 36 10 188 A1

DE 35 32 463 A1

[Title in German of the object of the invention:]

Heizungs- und/oder Klimaanlage für Kraftfahrzeuginnenräume

**HEATING AND/OR AIR-CONDITIONING INSTALLATION FOR
MOTOR VEHICLE PASSENGER COMPARTMENTS**

(57) In order for an individual rear compartment ventilation for motor vehicles' passenger compartments to be created, it is proposed, in accordance with the invention, that a cold-air as well as a warm-air duct is led into the area of the rear compartment ventilation nozzles. In that case, the temperature of the escaping air can be adjusted by means of relevant control valves.

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Description

The invention pertains to a device of the kind, specified in the preamble of the first claim.

From the German 'offenlegungsschrift' DE 30 02 351 A, there is known an additional control unit for the air conditioning of a rear compartment of motor vehicles. To this end, there is used an air duct [air conveying line], which is preferably arranged on the drive shaft tunnel. This air duct is connected to the heating and air-conditioning device, arranged in the front compartment. In the rear compartment, the said air duct has outlet openings for the ventilation, and outlet openings for the heating of the leg room [footwell or floor] of the rear compartment passengers. Each outlet opening is provided with an outlet shut-off valve. In such a way, the passengers of the rear compartment can adjust in a freely selectable manner the air distribution between ventilation and floor. However, the temperature of the air, escaping there, cannot be adjusted, because the air distribution duct is connected to the front-side heating and/or air-conditioning device, and the temperature is adjusted there.

It is an object of the proposed invention to create a simple opportunity to undertake a temperature adjustment in the rear compartment of the air, which is escaping there.

In accordance with the invention, this objective is achieved by means of the characteristic features of the first claim. As a result of the fact that a mixing chamber is extended in front of the rear-compartment openings, to which mixing chamber cold air and warm air is fed in separate ducts, an individual air-outlet temperature can be attained there. Self-evidently, the presupposition therefor is that the heating system heat exchanger is operational in the front-side heating device. However, this is problematic, because usually the possibility is also created in the front chamber for ventilation nozzles to be provided, which - over the course of operation of the heating system heat exchanger - allow only the non-constant temperature air to escape. As a result of the proposed arrangement, only a single, additional channel air-distribution channel is necessary without a multiple input of a second heat exchanger.

The refinement in accordance with claim 2 has the advantage that as a result of the provision of control valves in the mixing chamber, the desired temperature can be adjusted so that the air, escaping out of the air outlet openings has an uniform temperature distribution.

As a result of the refinement, as claimed in claim 3, heated air emerges in the leg room [footwell] when necessary, whose temperature level is higher than that of the air, emerging from

the ventilation nozzles. This is used to improve the comfort. In doing so, it can be functional in that case to install yet another control valve in the branch area of the air duct to the footwell [leg room], in order for the amount of the emerging air to be influenced.

The refinement, as claimed in claim 4, also creates the possibility for a right-left control to be provided to the passengers in the rear compartment as this is already practiced for the front passengers.

The refinement, as claimed in claim 5, has the advantage that the structural input for a constant temperature of the footwell ventilation is further reduced. Usually, a channel or duct is laid under the front seat from the warm-air side of the heating device. This air duct has an outlet opening in the direction of the footwell [leg room] of the rear compartment passengers.

The invention is elucidated in greater detail by means of a selected example.

Fig. 1 represents a diagrammatic side view through the rear compartment area of a motor vehicle passenger compartment [car saloon].

Fig. 2 is an alternative embodiment of the arrangement in accordance with Fig. 1;

Fig. 3a, b are two diagrammatically represented cross-sectional areas, having alternative design of the air outlet openings, depicted in Fig. 1.

Fig. 1 diagrammatically represents a side view of a footwell [leg room] of a motor vehicle. In this case, a front seat is denoted by 1, the seat pillow of the rear seat bench is denoted by 2, and the rear compartment footwell [leg room] is denoted by 3. A central console 5 is arranged above the rear-compartment leg room [footwell] 3 on a drive shaft tunnel [transmission tunnel], denoted by 4.

The central console 5 has an air outlet opening 6, which is equipped in usual way with rotatable and pivotable lamellae in order to adjust the air-flow, which is egressing there, in its direction.

Behind this air outlet opening 6, there is a mixing chamber 7. In this mixing chamber 7, two air distributing channels [ducts] 8 and 9 are discharging, which are arranged on the drive shaft tunnel 4. With their non-represented end, the two air-distributing channels 8 and 9 are connected to the heating device and/or air-conditioning device, arranged in the front passenger compartment. In doing so, the air duct 8 is used for the conveying of fresh air. When an evaporator is arranged in the front-side heating and/or air-conditioning device, the air duct 8 is arranged in such a way that it is branched towards the evaporator in the direction of the inflowing air. As a result of this, cooled air can also be conveyed in the air duct 8 to the mixing chamber 7.

The additional air duct 9 is connected on the warm-air side of the non-represented heating device and/or air-conditioning

device. As a result of this, heated air can be conveyed to the mixing chamber 7.

On the outlet 9 of the channel 8, respectively 11, of the channel [duct] 9, there is arranged a butterfly control valve 12, 13, respectively. With the help of that control valve 12, 13, the proportion of the air-flows entering the mixing chamber 7 from the air ducts 8 and 9, can be adjusted. Therewith, a temperature adjustment of the air, emerging out of the air outlet opening 6, is possible.

In the air duct 9, shortly before its outlet 11 into the mixing chamber 7, there is arranged an additional air duct 14, which leads to the rear-compartment footwell [leg room] 3. At the point, where this air-duct 14 branches off out of the air-duct 9, there is arranged a control valve 15, in order to shut off the air duct 14. In such a way, it is possible to convey in a controlled manner warm air to the rear compartment footwell.

The operational elements for the valves 12, 13 and 15 are arranged on convenient spot in the rear compartment footwell, functionally in the area of the air-outlet opening 6. Self-evidently, the air outlet opening 6 can also be shut-off by means of relevant operational elements.

Fig. 3a shows a cross-section through the arrangement, depicted in Fig. 1, at the height of the outlets 10 and 11 of the air ducts 8 and 9. Out of this, it can be seen that the air-ducts 14 are arranged on both sides of the drive shaft tunnel 4, and,

thus, discharge into the right and left rear-compartment footwell 3.

Fig. 3b shows an alternative embodiment form of the installation, depicted in Fig. 3. It differs from the design of the outlet openings of the air-ducts 14.

Self-evidently, the air outlet openings 6 can also be doubled, in order for the ventilation flows to be guided to the right and left part of the rear-compartment, and to be rendered adjustable in the direction of the air flow, and as far as air intensity is concerned.

Fig. 2 shows an arrangement, which is an alternative to the arrangement, depicted in Fig. 1. In this case, the air duct 9' is not arranged on the drive shaft tunnel 4 but leads - in a way, known in the abstract - under the front seat 1 to the rear-compartment footwell 3. In this case, it is also provided with an outlet opening 16, which can be shut-off by means of a control valve 17.

In order for constant-temperature air to be also made now available at the outlet opening, a connecting channel 18 is provided from air duct 9' to air duct 8, arranged on the drive shaft tunnel 4. At the point of overflow of the connecting channel 18 into the air duct 8, there is provided a control valve 19. Correspondingly, the mixing chamber 7' is formed in the area of the transition from the connecting channel 18 into the air duct 8. Therewith, a possibility is also created in this case for a constant-temperature air to be allowed to flow out of the

air outlet opening 6. The operational elements for the individual control and regulation valves are also arranged in the central console 5 on convenient spots.

PATENT CLAIMS

1. Heating system and/or air-conditioning system for motor vehicles passenger compartments, having a heating and/or air-conditioning device, arranged in the front area of the passenger compartment, out of which heating and air-conditioning device air-distribution channels branch off to the air outlet openings, whereby an air-distribution channel [duct] leads to the rear passenger compartment, which air-distribution duct has at least an air outlet opening for ventilation, which outlet opening can be shut off by means of a control valve, and whose operational elements are arranged in the rear compartment, **characterized in that** a second air duct (9, 9') leads to the rear passenger compartment, that one of the air ducts (9, 9') is connected in such a way to the heating- and/or air-conditioning device that heated up air can be conveyed there, and the other air duct (8) is in such a way arranged on the heating- and/or air-conditioning device that ambient air or cooled air can be conveyed in it, an both air ducts (8, 9) empty in front of the air outlet opening (6) for the ventilation of the rear passenger compartment into a mixing chamber (7, 7').

2. Heating system and/or air-conditioning system as claimed in claim 1, characterized in that at the outlet (10, 11) of each air duct (8, 9) into the mixing chamber (7), there is provided a controllable butterfly control valve (12, 13).

3. Heating system and/or air-conditioning system as claimed in claim 1 or 2, characterized in that from the warm-air conveying duct (9), an air duct (14) branches off in front of the mixing chamber (7, 7') to the rear passenger compartment (3).

4. Heating system and/or air-conditioning system as claimed in one of the preceding claims, characterized in that the warm-air conveying duct (9, 9') is designed as cut lengthwise for the purpose of a left-right regulation.

5. Heating system and/or air-conditioning system as claimed in one of the preceding claims, characterized in that the warm-air conveying air duct (9') ends in the footwell 3 of the rear passenger compartment, and that branching off from it, there is provided a connecting duct (18) to the mixing chamber (7').

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John M Koytcheff, MSc
Translator [GERMAN and Germanic languages]
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